SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1781.—Vol. XXXIX. LONDON, SATURDAY, OCTOBER 9, 1869. {STAMPED .. SIXPENCE. UNSTAMPED, FIVEPENCE.

Original Correspondence.

COAL IN INDIA.

Sir,—I shall be much obliged by your publishing in the Journal the following authenticated fact of the discovery of coal at a spot in the Nizam's Domains, very closely adjoining the Kistnah district.

An intelligent "Koomtee" (native shopkeeper) brought, on Aug. 16, to the Collector of the Kistnah district a large block of shale and a smaller lump of pure coal, which he states he found between Bradrachellam, on the Godavery and Juggiahpettah of the Kistnah district, and has required to be assured of a large reward before he points out the locality.

The coal burns with a smell of coal, and is reduced to a whitish-brown ash. Specimens of the coal and shale were sent on the same day (Aug. 16) to the Governor of Madras and Madras Board of Revenue by the Collector of the Kistnah district, from whom this information has been officially received by me.

Francis Applegath, 33d, Lieut.-Col.

Vitanagram, Northern District, Aug. 26.

THE FERNDALE COLLIERY EXPLOSION.

Sir,—Pray favour me by the insertion of this note in next week's *Mining Journal*. In your report on the Ferndale disaster you quote my evidence to the effect that the water-gauge was 2 *feet* 10 *inches*.

This is the reporter's error. My statement was that I regretted that a portion of the main returns, of very noble size, had not been continued in all its length—because, if such had been the case, "the objectionable water-gauge of 2·10 inches (*i.e*, two inches and a tenth) might have been reduced by at least half-an-inch.

Clifton, Oct. 2. Lionel Brough.

THE FERNDALE EXPLOSION.

Sir,—Referring to the remarks on the Ferndale Explosion in last week's Journal, and in particular to those concerning our lamps, we wish to deny, through the medium of your columns, that they "are easily extinguished by being moved." We are aware that this may have been partly true of some of our lamps first issued, but the cause of this was immediately removed. We have testimonials and good reports from many collieries, sufficient to satisfy anyone as to their practical character. At the Hetton Collieries a large number have been in use nine months. Had they not given satisfaction it is more than probable they would have been withdrawn long before now; instead of this, however, further quantities are being sent into the pits. A contemporary says our lamps are objectionable "from weight or other causes." We would beg to state that the No. 1 (improved Stephenson) is lighter than an average Geordie, and our No. 2 (improved Clanny) is lighter than an average Clanny. And we are so confident that they will give satisfaction on a fair trial, that any colliery owner or mining engineer can have a sample on approbation, on the condition of his paying the carriage. The opinions of the mining inspectors, Messrs. Wales and Brough, seem very satisfactorily to account for the explosion; and the cause assigned is in harmony with both science and practice. One good result arising from the candid expression of their opinions will be to shake the opinions of many who have held a firm faith in the safety of the ordinary lamps; and we only hope that in any future explosion that may occur equal ability and penetration may be brought to bear on the investigation into its cause, and that such inadequate and improbable conjectures as the ignition of small quantities of gunpowder, explosions of dust, &c., may never again be put forth. John Hann and Son.

Hetton Colliery Office, Fence Houses, Oct. 6.

P.S.—There is also a misapprehension in stating that our lamps are safe up to 48 feet per second. We have proved them safe to 48 feet, but how much *higher* than this it is difficult to state, as we could discover no indication to measure their further capabilities.

THE FERNDALE EXPLOSION, AND INQUEST.

Sir,—Now the official investigation in reference to the Ferndale calamity has terminated, the subject will, doubtless, prove the source of a good deal of correspondence, from which, let us hope, much valuable information, useful for the future working of our collieries, will be gleaned. All interested in colliery operations cannot too highly value the advantage of having free access to the columns of the *Mining Journal* wherein to express their views, however diversified those views and opinions may prove. I have carefully read, and also with much interest, almost the whole of the evidence given in reference to the melancholy event; and as the whole facts of the case, and also the suggestions made by the coroner's jury, are of the greatest moment to the mining world generally, I trust you will allow me space to make a few observations thereon.

And, in the first place, Mr. Editor, I think everybody will agree with me when I state that the Ferndale cannot be considered an ordinary colliery in the general acceptation of the term. It is amongst the most extensive in the kingdom, its average output is between 500 and 600 tons of coal per day; on some occasions it has amounted to 700 tons per day. There were 420 men and boys employed (on the morning of the accident there were 369 in the pit, distributed over its various workings); and what is more, it is not simply a "fiery pit," but is, according to the emphatic language of Mr. Brough (one of the most intelligent and experienced Government Inspectors in the kingdom), "a virgin magazine of fire-damp, which has not been tapped except at Ferndale." These things combined surely take the Ferndale out of the category of ordinary collieries. Ordinary precautions, therefore, are not sufficient to prevent the occurrence of such dread calamities. Extraordinary care and attention should characterise every department in order to secure the safety of the lives of the workmen, and to render the colliery fit for the abode of such a large number of men. But no man, however careful or able, can guard against extraordinary occurrences. What, then, are the facts as disclosed by the evidence at the inquest?

But, Mr. Editor, perhaps you will permit me to remark, in the first place, that I, for one (considering the utter irrelevancy of some of the questions propounded), cannot help thinking that the jury entered upon this painful enquiry with their minds somewhat biased against the managers, officers, and proprietors of the pit. Naturally enough they could not help recollecting that only two years before a similar unhappy event had occurred in the colliery, on which occasion a very large number of lives were also sacrificed. This, doubtless, somewhat influenced their minds, although they should, too, in all fairness and justness have remembered that the lamentable catastrophe in November, 1867, was clearly traced to the culpable recklessness of one of the colliers removing the cap off his lamp—reprehensible conduct which no management can guard against; and the jury should not, therefore, have allowed the previous event to have influenced their minds in the slightest degree. But what are the facts in connection with the late accident? Ventilation is the first essential, not only in this, but every other pit in the kingdom. The Ferndale had three distinct and separate workings, or, if I may so call them "*panels*," each being separately and distinctly ventilated. We may take it that the total quantity of air which passed into the colliery was between 120,000 and 130,000 cubic feet per minute. Of this quantity somewhere about from 20,000 to 25,000 went into the Duffryn districts, where the explosion took place. The evidence on this point is most positive and distinct. No complaint had been made as to the general inefficiency of air, and for some days prior to the explosion it was considered by all who worked there to be quite as good as it had had been for days, weeks, and months previously. Of course, with such enormous daily outputs there must necessarily be large vacuums, where a little explosive gas would lodge, but this was easily displaced by the ordinary precautions so well known by the most inexperienced collier; and Mr. Brough, speaking of the ventilation of the pit, stated that it was ample to provide for the ventilation of the pit as "required under the provisions of the present Actof Parliament"—that is to say, in other words, it was sufficient to dilute and render harmless the noxious and explosive gas. There being, then, sufficient intake air, was its distribution scientifically and properly managed? Upon this point I, for one, would allow it to rest upon the well-known ability and experience of the general manager—Mr. Beddlington, especially when I find that there had been no general complaint by the men working in the "faces," where it is well known that the men work hardest, and, consequently, require even more of the life-giving air. Of course, now the fatal catastrophe has happened, one would like to have seen a more "abundant excess of ventilation," for it is far better to have an excess of air than simply sufficient. But, Sir, in my opinion, judging from the evidence, no ventilation in the world would have been sufficient to have altogether prevented such a contingency as that which unquestionally occurred, and which led to the explosion, and as such I cannot see upon what ground the manager and officers of the colliery deserve the censure of the jury, they having, according to the opinion of the Government Inspectors, carried out the provisions of the Act of Parliament.

The accident not having, therefore, been caused by defect of ventilation, what did produce it? All explosions, or at least the great majority of them, are caused by one, or both combined, of two causes—either the explosion of a large quantity of gas suddenly given off, and which is technically called "a blower," or by the explosion of gas lodged in the different goaves. I think we may summarily dismiss the latter assumption as being the cause of the present explosion. The evidence distinctly repudiates the supposition that there was any dangerous congregation of explosive gas in the goaves. There was a little in the face of the heading, but it was easily displaced, and no damage resulted therefrom. There must, then, in my opinion, have been a sudden blower, and this assertion is borne out by the fact that on the very morning of the accident all things were reported as being "all right." Now, there is one little bit of evidence upon this point which is most significant. We have it in evidence that the night before the explosion there was a "squeeze" or "throttling" of one of the air passages in the Rhondda district, and in the immediate vicinity of the scene of the explosion. The air being thus seriously impeded, gas generated rapidly, and in all probability (of course I cannot say for certainty) it was the sudden striking into the heading in the removing of the "throttle" which caused the explosion.

The evidence in reference to the safety of our so-called "safety-lamps" is of vital importance to colliery managers and proprietors. Is it that we have hitherto been working our mines with a lamp which is not safe? Such is the opinion of some of the most able men of the day; and our mining and mechanical engineers must, therefore, at once set themselves to remedy the defect, and solve the difficult problem as to what lamp will be safe while a current of highly charged inflammable gas is passing. I believe, for my own part, our mining men will prove equal to the emergency, and that shortly we shall be able to produce a lamp which will not only be safe, but what is of equal importance, defy the ingenuity of the colliers to unlock.

With regard to the recommendations of the jury, and their censure upon the manager and officers, they must be taken for what they are worth. Whether shopkeepers and the like, who now constitute our juries, are capable of forming a correct opinion upon the working of collieries—the distribution of air and the like deeply scientific questions—is a matter into which I, for one, do not care to enquire; I have my own view thereon, which, probably, if expressed, would not be over complimentary to the jury, and, therefore, I refrain from saying anything more about it. With regard to filling up abandoned old workings, that, Sir, is a question which was advocated some months since in an editorial in your own columns, and is, therefore, no new question. Where practical, it is, doubtless, carried out, and that with beneficial results. Taking, therefore, the whole facts into serious consideration, I think the evidence makes plain the following—that the ventilation of the Ferndale was all that was and is required under the present provisions of the Act of Parliament; that the explosion occurred from a sudden "blower," which no "excess of ventilation" would have altogether avoided, and that, consequently, the manager and officers do not deserve the censure passed upon them by the jury of grocers, tailors, shoemakers, tallow-chandlers, &c., who, in all probability, sat in such solemn conclave upon the management of the colliery in question.—*South Wales, Oct.* 8. Scrutator.

COLLIERY EXPLOSIONS.

Sir,—For the information of your Leeds correspondent, "A. V.," and others, on the filling up old workings after they are abandoned, I may observe that it is the practice of most collieries working the the Four-feet and other steam coals in the Rhondda and Aberdare districts to work by long wall, the roads being about 15 yards apart; the space between the roads is filled up with small coal, and other refuse, sometimes the top and bottom of the roads. This is done as the excavation goes on until 60 yards are reached, when the stall is stopped, and the road is then filled up with the refuse stone got from other stalls in the same cross-heading, or perhaps from another part of the mine. The effect of this is to prevent falling of the roof, and the escape of gas from the superincumbent strata, and to leave no space for the lodgment of gas. Where there is sufficient material this is generally done; in other cases, from the want of refuse stone, this is difficult to do, and is not so systematically followed up as it ought to be. The cross-headings in some cases are also filled up. On the stall and pillar system of working the principle is also carried out of filling up. C. V.

COAL-CUTTING MACHINERY.

Sir,—I think a mistake has been made in the article on the subject of Coal-Cutting Machinery, in last week's Journal. There is a colliery, called Waterloo Colliery, near Leeds, as described, which is also near to Waterloo Main Colliery, but they are two separate and distinct collieries, belonging to different masters, and I am not aware that there is either a Mr. Waddington or a coal-cutting machine at Waterloo Colliery. J. Rothery.

Waterloo Main Colliery, Leeds, Oct. 4.

COAL-CUTTING MACHINERY.

Sir,—I noticed the letter of a correspondent, signed "Collier," in the Supplement to the Journal of Sept. 25, and I considered he handled the pick so badly that he must either be working entirely in the dark or had a lamp that gave him but a very dim light. I thought he ought first to improve his light before complaining so much of the pick, so that he would be better able to judge. I, therefore, on these grounds, considered his remarks scarcely worthy of attention. I think by the explanation and opportunities your able correspondent, "A Coal Owner," has given him, he ("Collier") will be able to see that the pick does not require the "twist" or "pick-up blow" that he had imagined, but is really a useful tool in the hands of those who know how to use it, and it is quite evident "A Coal Owner" does, although he does not give very good datum, from which he says "anybody can make the calculation as to the speed:" 30,000 tons, he says, is cut in twelve months. From these figures the speed of the machine must greatly depend on the thickness of the seam. If the thickness be such as to give 1 ton per yard, and we say 350 working days in the year, then the speed of the machine will be about 80 yards per day; but if the thickness of the seam be such as to give 2 tons per yard, then the speed of the machine will be about 40 yards per day; therefore, had not your readers been so frequently told how much this pick-machine could do, they would have been, like the poor "Collier," yet in the dark. I quite agree with "A Coal Owner" that the pick machine is in every way the likeliest one, and always has been. The inventors (Messrs. Ridley and Rothery) from the very first one they made always gave preference to the blow with the pick to any other kind of motion, although they had much to do with the traversing horizontal slotting-machine. In my opinion the pick-machine will be *the* machine. A. B.

MINING BY MACHINERY.

Sir,—Although several of the machine drills which have been introduced have been said to work very efficiently, it is a curious fact that their use is not continued in any mine wherein they have been tried. Not very long since it was stated that an invention was at work in Tincroft Mine which did a large amount of work, and the inventor was said to have undertaken a certain amount of work at a lower price than the cost of manual labour, and yet to have realised a profit. Now, if this were so why has it not been adopted at Tincroft, instead of being practically abandoned as soon as the contract with the inventor was completed? The truth is that the machine did not answer expectations, and that when the purchase of the machine and the royalty payable are taken into consideration there is a positive loss from using it. Any mine captain in Cornwall would be but too glad to arrange with the owner of boring machines to drive his levels, even at the full cost of manual labour, if he could get the work done in half the time; but, stoppages and repairs considered, I have never seen any machine (and I have seen most that have been tried in Cornwall) that would even make as much speed as an ordinary pare of miners. They work well, I know, while they are at work, but they are continually stopping for alterations and repairs, so that taking two months' work together no time is saved.

It is for this reason that we no longer hear anything of Richards' and Abegg's, Crease's, Brunton's, Dœring's, and the rest; they are ingenious, but not economic, and are, therefore, not likely to be worked, except for the account of the inventors. Mine adventurers could not afford it. There is now, I hear, another machine about to be tried, which appears even less likely to succeed, because the power required to work it will be enormous. It is the invention of Mr. John Darlington, of Moorgate-street Chambers, and is a modification of Mr. Leschot's diamond-pointed drill. The drill is mounted in a tube, at one end of which is a toothed wheel. Connected with this is another toothed wheel, fastened upon the axle of a screw-shaft, which is caused to rotate by the forward and backward motion of a block with a female screw turned in it. This block is made fast to the piston-rod of the driving cylinder, and water, or other power, is to be used to set the whole in motion. The arrangement is compact and simple, but the friction will be enormous; in the first place, between the collar and the Archimedian screw; and, secondly, between the tooth-wheels. As to the use of diamonds, I think them unnecessary, as with good steel Z-ended points all that is necessary can be done, and the placing of the screw by the side of the drill I think is decidedly objectionable. If the motion be communicated by a screw at all there is nothing like applying the powder direct; this was done in Abegg's invention, which was really an ordinary borer, with a screw shaft caused to rotate by a collar, with handles to turn it. With this drill a great deal of work could be got through—I should think twice as much with the same amount of labour; but the nuisance was that it was awkward to get the holes in the right direction. I think, however, that if a Y-shaped support were adapted to the back of it, it would be equal to any machine proposed, and far better than any of those which require steam, water, &c., to drive them. Miner.

Pool, Oct. 4.

HIGH AND LOW PRESSURE ENGINE.

Sir,—Some three months since you published a description of an improved engine by Mr. Thomas Craddock, with which I was much struck, as for simplicity and ingenuity it certainly appeared to surpass anything I had seen. The close proximity of the two cylinders to each other, and great facilities for the steam passing from one to the other, appear to be great recommendations. I believe that for cheapness and compactness there is no engine manufactured which will at all compare with it, and yet I have seen no effort made to in-

troduce it into the market. It is to be regretted that nothing is done to facilitate the testing of such inventions as these, which really have much more in them than many which are patented. Indeed, as to patents, they are either too protective or not sufficiently so, and the consequence is that they are worthless alike to real inventors and to the public. If the inventor of anything were enabled to compel all improvers to pay him royalty for the original idea, or permit him to use their improvements for nothing, there would be something like justice, and so there would be if every modification, however minute, were permitted to be the subject of a distinct patent, but at present we have neither the one nor the other, and the consequence is that patents are equally injurious to everyone.

Now, it seems to me that, looking at the diagrams given in the *Mining Journal* by Mr. Craddock, such an engine of (say) 3-horse power could readily be manufactured and sold at a good profit for 15*l.*, and at that price I am sure it could quickly be brought into use for a variety of useful purposes. For mining purposes there are such as stone-breakers, rotating buddles, and various other machinery, for which such an engine would be invaluable; and in quarrying slate-cutting machines could well be worked with it. As to the manner in which Mr. Craddock would be recompensed for his ingenuity I will say nothing—he has given the invention to the public instead of submitting it to a manufacturer, from whom he could have obtained payment, and thus refutes completely the statement of the advocates of patents that if we had no patents we should have no inventions.

Oct. 6. ENGINEER.

NEW SOURCE OF A RARE MINERAL.

Sir,—In examining, some time ago, specimens of wolfram from Auvergne, I found that they contained a notable amount of the rare and expensive mineral columbite, or niobite. It is left as a bright black crystalline residue, along with a little quartz, when wolfram is thoroughly dissolved in aqua regia. This accounts for the presence of minute quantities of niobic acid, occasionally noticed in the analysis of wolfram when such analysis is made with care.

I have since sought for niobic, or columbic, acid in samples of tunsgate of soda prepared from English wolfram, and have likewise found a minute quantity present. This leads me to believe that columbite is present in the wolfram ground in Cornwall, and, if so, it will prove an interesting source of that rare substance niobic acid. As niobic minerals are so very expensive to purchase, many a chemical student, wishing to study the re-actions and properties of niobic, or columbic, acid, may procure a small supply of it by collecting the residue of dissolved wolfram, which is a comparatively common mineral in our tin districts. Doubtless, also, where tunsgate of soda is prepared from wolfram the residue would, if submitted to careful examination, prove to be rich in niobic acid.

T. L. Phipson, Ph.D., F.C.S.

Laboratory of Analytical Chemistry, Putney, S.W., Oct. 2.

IRON WORKS, AND COAL MINING IN SOUTH WALES.

Sir,—The Aberdare Iron Company's Works.—The fear of foreign competition, adverted to in last week's Journal, would be considerably dispelled on a visit to the above works. We observed almost every improvement suggested by science and economy, many of which are in practical operation in other iron-making districts, while some are as yet little known. The works generally comprise the two Abernant blast-furnaces and coke-ovens, the forges and rolling-mills, about 200 yards distant from the furnaces, the collieries, situated in various directions from the iron works, and at considerable elevations up the mountain on the eastern side of the Aberdare Valley; the three blast-furnaces at Llwydcoed, and coke-ovens, together with ironstone openings in the lowest coal measures; and the Taff Vale Iron Works, near Treforest, consisting of rail-mills only. These works are all under the proprietorship of Messrs. Richard Fothergill and Company. The transit of materials from one department of the works to another, and also between the works and the Taff Vale and the Vale of Neath Railways, is effected by means of locomotives, 12 of which run on the 4 ft. 8½ in. gauge.

The Llwydcoed Blast-Furnaces.—These are situated about one mile north of Abernant, consisting of three blast-furnaces, 42 ft. high, 18 ft. in the bosh; two of these now in operation; they are supplied with Welsh mine one-fourth, Cumberland and Northamptonshire ores, and coke made in ovens. Instead of burning large coal in open clamps, the small coal obtained from the 4 ft. and other seams of the steam coal series is mixed with the bituminous coal obtained from the No. 3 seam in the Rhondda Valley. The coal is first crushed by rollers to a uniform size, and is then mixed, one-half of each kind, for coking together in the ovens. This produces denser coke than the open clamps, and utilises the small steam coal. There are 168 coke-ovens erected for the supply of Llwydcoed and Abernant furnaces. About one-half of these are situated at Abernant. The Llwydcoed furnaces are closed at top by bells, and the gases are utilised for heating the blast-pipes and boilers. Very little coal is used for these purposes. The blast is heated from 850° to 900° at the tuyeres, and is supplied by two water-wheels, each 40-ft. diameter, 5 ft. wide, one above the other, working two blowing cylinders, each 54-in. diameter, 7-ft. stroke. There are, besides, one engine, with 84-in. blowing-cylinder, 6-ft. stroke; one engine with 78-in. blowing-cylinder, 7-ft. stroke; one engine with 64-in. blowing-cylinder, 7-ft. stroke, and one engine having two blowing-cylinders, each 54-in. and 6-ft. stroke. All these blow into one large blast-pipe. There are three double refineries here. The mine workings are on the mountain sides, principally levels and patches. Three locomotives are used on the 2 ft. 8 in. gauge, for the conveyance of mine to the works, running on gradients varying from 1 in 15 to 1 in 28. No coal is worked in this locality. The average production of pig-iron from three furnaces, including one at Abernant, is 1105 tons weekly, or 368 tons for each, making forge iron. One of Llwydcoed furnaces has produced 446 tons in one week. This enormous make rivals the production of the large Cleveland furnaces, and is probably due to the nature of the iron-stones used and the plentiful supply of blast provided and forced into the furnaces. One of the Llwydcoed furnaces was commenced, and the first cast run from it, in July, 1801, by Mr. George Scale, which was the foundation of this establishment.

Abernant Blast-Furnaces.—Shortly after the opening of the Llwydcoed furnace, Messrs. F. and R. Tappinton commenced blast-furnaces at Abernant; these have grown into manufacturing works of colossal proportions, principally under the management of Mr. Fothergill, who entered about 24 years ago. There are two blast-furnaces erected here, one in operation, 40 ft. high, 19 ft. in bosh; one 52 ft. high, 18 ft. bosh, is ready to be lighted. These are closed at the top with bells, and supplied with hot-blast at 850°. Five blowing-engines are erected—One 78-in. blowing cylinder, 7-ft. stroke; one 68-in. blowing cylinder, 6-ft. stroke; one 52-in. blowing cylinder, 5-ft. stroke; four 30-in. blowing cylinders, 2-ft. stroke. The two first only are in operation at present, for one furnace and two double refineries. The gases are utilised for heating the blast-pipes and boilers.

Abernant Forges and Mills.—This department of the iron manufacture occupies an immense area, being covered with iron roofing, supported on cast-iron columns, and is laid out on the best principles of convenience and capability of doing work. There are 78 puddling-furnaces, supplying four trains of 19-in. puddle-bar rolls; there are four engines for driving these trains. The puddling-furnaces are supplied with blast from eight 48-in. fans, driven by two 10-in. cylinders; they are Lloyd's patent noiseless fans. This system has been in practice here many years; it has the advantages of saving fuel, and produces more work in a given time. There are 27 balling furnaces; 21 of these are supplied with blast from six 48-in. fans, on the same principle as those above described, and with the same advantages. There are two large rail-mills here, and others for blooming, and for the manufacture of other railway work—as fish-plates and Russian chair-plates; there are three engines to drive these mills. Besides these, there are 13 engines for driving saws, shears, presses, and punches, including two pairs of 10-in. engines for driving the fans. The most of these engines work direct to the machinery, and one machine is independent of the others. One pair of shears is actuated by a single steam cylinder, making 150 strokes per minute; the shears make 8 strokes per minute, and were used at our visit in cutting bars, cold, 9 in. by 3 in., for the top and bottom of rail piles. There are 15 large boil rs to supply these engines with steam. The heat from the puddling and balling furnaces is not applied for heating boilers, but one or two are being got ready for this purpose; this will not affect the working of the fan-blast, if it is carried out. One steam-hammer—Lilleshall Company's double-acting—is used for special orders, and another of the same kind is being made. The separation of the dross in the puddle-balls is done nearly altogether by double squeezers. The make of puddled-bars is from 1200 to 1300 tons per week; and this supplies the Abernant and Treforest Mills, which produce about 1150 tons of railway iron weekly. Connected with Abernant Works there are extensive foundries, smiths,' carpenters,' and fitting shops, capable of manufacturing engines up to 60-horse power. At Treforest Works there are 24 balling furnaces, and two 48-in. fans supply them with blast, driven by the lathe-engine. There are six separate boilers for supplying the engines with steam.

Collieries in Conjunction with Abernant Iron Works.—There are seven pits from which coal is raised, to the extent of 950 tons per day; about 500 tons of this is sent to Cardiff and Swansea for shipment, the remainder is used at the Abernant and Llwydcoed Works; besides, 200 tons per day is got from No. 3 seam at Bwllfa, in the Rhondda Valley, to mix with the steam coal for coking in ovens. The most of the mineral property is leased from the Marquis of Bute, but there are other lessors.

No. 9 Pits.—The downcast, 16 by 11 ft., is the drawing pit—the upcast, 10¼ ft. diameter, on which an air-stack, 85 ft. high, is erected, of the same size; the pits are walled with brickwork from top to bottom; the depth is 66 yards to the Dirty seam, so called from the clod in the middle of it. The winding-engine at the coal pit has one 24½-inch horizontal cylinder, 4-ft. stoke, cog-wheels 1 to 4, two rope-rolls 9 ft. diameter, flat wire-ropes; the wheels and rope-rolls are outside the house. This engine either pumps and winds together, or pumps water at nights only, as required. Coal is raised from three seams to the extent of 250 tons per day—the 6 ft., 9 ft., and Dirty seams. One tram, holding 22 cwts. of coal, is raised in each carriage; the carriages run in three wood guides. At the bottom of the pit the levels go east and west; the east level meeting a fault a short distance from the pit strikes the 9 ft. seam, in which the level is continued east; from the 9 ft. seam the 6 ft. seam is reached by a stone drift rising 4 to 5 in. per yard, driven 195 yards to the south. Four trams are run self-acting on this incline, with 6-ft. drum, 1-in. wire-ropes. The level at the top of the incline is driven eastward about 500 yards; four cross-headings are in operation to the rise or north; these usually go 250 yards to the rise, and are made 70 yards apart. The stalls are driven out of these to the east, they are both double and single-road, according to the roof; the double stalls are 18 yards wide, pillar from 8 to 10 yards between each, the stalls are filled up in part with the holing, and with the stone taken down in the roads—18 inches. The single stalls are 8 yards wide, and 8 yards of coal left as pillar; naked lights are used in this seam, powder required when the coal sticks, average thickness of 6 ft. seam is 3 ft. 10 in.; cliff roof variable, bastard under-clay; the holing is made in the bottom of the clay. The 9 ft. seam measures (top coal) 4 ft. 6 in.; shale, 2 to 9 in.; bottom coal, 4 ft. 6 in.=9 ft. 2 in. The roof of the 9 ft. is usually bad, and the under-clay is of the bastard kind. The 9 ft. seam is got by single and double stalls, suitable pillars being left between them; the stalls are driven 60 yards or more in length, when the pillars are worked backwards as entirely as possible. Lamps are used in this seam, powder is not allowed. Owing to the great height of the seam, and the deficiency of stone and debris, the stalls are only partially filled up; timber is more largely required in this case. Section of the Dirty seam—good roof (top coal), 2 ft.; clod or shale, 1 ft. 8 in.; bottom coal, 2 ft.; shaly under-clay. This is worked by stall and pillar, it is got at two points from drifts driven north across the measures from the 9 ft. seam; the coal is inferior to the seams above, it produces little gas, is worked with naked lights. The roads are laid with 21-lbs. single head rails, cast-iron sleeper and chairs, both for main rods and stalls, in all the collieries; gauge, 2 ft. 8 in. The trams are open-bodied, 18-in. flange-wheels. Little water is met with in this mine, nor in the others worked by this company, considering the slight depth of most of them. The furnaces, 8 ft. square each, produce the ventilation, amounting to 62,000 cubic feet per minute. The principal air-ways are 42 ft. area, the water-gauge is 1 in.

The Tunnel Pits.—These are 16 by 11 feet drawing-pits, and 10½ ft. upcast, with air-stack built over it. The depth is 165 yards to the 9 ft. seam. These pits are walled throughout, and the other pits hereafter named are secured in the same way, and the same size of pits is adhered to. The winding-engine at this pit has two 18-in. horizontal cylinders, 3 ft.-stroke, cog-wheels 1½ to 8, two 9-ft. rope-rolls, flat wire-ropes; two plain boilers. No water is pumped here. The levels go west and east from the bottom of the pit—that to the west proceeds to the No. 9 pit, that to the east has been driven 600 yards, or more, to where some large faults are met with. A cross-heading out of the east level has been driven up about 500 yards close to the boundary, other cross-headings unite by levels to it. The 6 ft. coal is raised from a landing 25 yards up the pit, and the 4 ft. coal from a landing about 50 yards from the bottom of the pit, with fans or catches at each seam. Only one band is used for the two upper seams, but two bands are used from the bottom. About 200 tons of coal are raised per day from three seams. The coal is got on the stall and pillar system, and the workings are conducted on the same principle as in the No. 9 pit. There is one ventilating-furnace at the 9 ft. seam, 9 ft. wide by 8 ft., producing a circulation of 42,000 cubic feet per minute distributed to each seam. The rule at these mines is to give a separate split of air to each cross-heading, which dispenses with doors. No serious accident from explosion has occurred at these collieries. Mr. Smith has been connected with them as manager about 40 years; he attributes this freedom from accident to his employing careful and experienced overmen and firemen. It is evident the men generally must have some credit for this result, though the mines do not produce fire-damp so freely as those deeper and lower down in the valley, yet sufficient is emitted to cause accumulation of gas in a short space of time, if any neglect of the ventilating arrangements were attempted, or violation of the rules, having reference to doors, air-ways, brattice, &c.

Cwm Bach Pits.—Downcast and upcast, 70 yards deep to 9 feet seam. The 6 ft. and 9 ft. seams are worked to the extent of 180 tons per day. The 6 ft. seam is 4 ft. 2 in. here of good coal; better roof than in the No. 9 pit, got principally by double stalls and wide cross-headings. One 20-in. winding-engine, 5-ft. stroke.

Blaenant and Mountain Pits.—Mountain pit an upcast and drawing pit; single band. Depth 164 yards to 9 ft. seam; coal drawn also from 4 ft. and 6 ft. seams at their respective levels. The trams are sent down—seven at once—by a self-acting incline, 700 yards long, to the Blaenant pit, with wheel and wire-rope. From the Blaenant pit another self-acting incline, 1130 yards, takes the produce of both pits to the coke-yard; the trams are placed on carriages—six on each—drums and wire-ropes adopted. The 9 ft. is exhausted in the Blaenant pit, and is filled up to the 6 ft. seam; depth 134 yards to the latter. The 4 ft. and Yard seams reached by rise stone drifts; both are worked in conjunction with the 6 ft. The Blaenant pit is downcast; coal raised by water balance. About 50,000 cubic feet of air per minute is circulated with furnace-power. The Yard seam is worked by long wall; the other seams on the stall and pillar system, already described: 200 tons of coal per day are sent from these pits together.

River Level Pit.—The 9 feet seam has been worked here about 45 years, at the depth of 31 yards; it is now exhausted, and the pit is sunk to the 7 feet seam, depth 107 yards; about 100 tons per day at present are got from the 7 feet and Gelly-deg seams; the latter is 3 ft. thick. Section of 7 feet seam:—Top coal, 1 ft. 8 in.; clod, 9 in. to 3 ft.; bottom coal, 3 ft. 10 in. Roof moderate; coal got by stall and pillar. Winding-engine, 16-in. horizontal, 2½-ft. stroke; cog-wheels 10 to 1; rope-rolls outside, 9 feet diameter, flat wire-ropes. Pumping-engine, 16-inch horizontal, 2½-feet stroke, second motion; forcing set of pumps 76 yards long, in the drawing pit, off-take adit 30 yards down. The Forge balance pit, raises 9 feet coal, nearly exhausted.

Meadows' Pumping-Pit, 12 feet diameter; engine, one 20-inch horizontal cylinder, 4-ft. stroke; 12-in. forcing set at top, and 12-in. bucket-lift at bottom. The Cwm Bach coal is screened and sent for sale to Cardiff and Swansea. The coal from No. 9 pit is sent principally to Swansea, some to Cardiff; the produce from the Tunnel pit is sent to Swansea; the River Level pit and Forge pit supply the forges; the Mountain and Blaenant pits supply coal to forges and mills, coke-ovens, and for sale. There are 70 horses used for underground hauling; no engine haulage.

Mine Workings.—The mine is got from levels in the neighbourhood of Llwydcoed; about 3000 tons worked per month. The mine at present is got from the lowest strata below the Gelly-deg seam, that being the lowest workable coal. The ironstone found in the upper strata of the following section is not worked, except when it is got in the form of balls from the roof of the 4 ft. and other seams.

Abstract of the Section of Strata in Abernant Royalty.

		Yds.	ft.	in.
Strata, with nine beds of coal, varying from 3 to 14 in., and mine ground		92	2	4
Yard seam	Coal ..... 3 ft. 0 in. / Clod ..... 1 0 / Coal 1 0	1	2	0
Strata		8	0	0
Four-feet seam		1	2	6
Strata, with seam of coal 18 in., and ironstone balls		27	2	0
Six-feet seam		0	3	10
Strata, four seams of coal from 6 in. to 2 ft., and ironstone		23	1	8
Nine-feet seam	Coal ..... 4 ft. 2 in. / Clod ..... 0 8 / Coal 4 2	3	0	0
Strata		10	1	0
Dirty seam	Coal ..... 2 ft. 0 in. / Clod ..... 1 4 / Coal 1 5	1	1	9
Strata, with four seams of coal varying from 7 to 20 in., and mine ground		27	1	1
Gadly's seam, or Seven-feet	Coal ..... 1 ft. 6 in. / Clod ..... 1 6 / Coal 4 6	2	1	6
Strata		6	0	7
Seam of coal	Coal ..... 2 ft. 5 in. / Clod ..... 2 4 / Coal 1 9	2	0	6
Strata		15	2	9
Gelly-deg seam		1	0	0
Strata, with courses of ironstone, including the fine pins		23	2	2
Ironstone, blue vein		0	0	5
Strata		14	2	8
Ironstone, big vein		0	0	3
Strata		2	0	3
Coal		0	1	6
Strata and ironstone ground		7	1	6
Ironstone		0	0	4
Total		275	2	7

Oct. 5. M. B. Gardner.

[In my notice of the Plymouth Works, last week, I omitted to state that some of the Duffryn furnaces are 18 ft. in the bosh. There are two blast-engines in addition to the large water-wheels at Duffryn—one 45-in. horizontal cylinder, 90-in. blowing cylinder, 7-ft. stroke; one 52½-in. beam-engine, 122-in. blowing cylinder, 8-ft. stroke. There are similar engines for the Plymouth furnaces.]

THE SOUTH STAFFORDSHIRE AND SHROPSHIRE COAL FIELDS—No. XVIII.

Sir,—In a former letter I gave an opinion that the best prospect of an extension of the Shropshire coal fields lay north of the Old Roman-road, at Watling-street and Sherriff Hales. I also promised to give particulars of a boring now in progress in that direction, at a point seven miles from Market Drayton, on the borders of the two counties of Shropshire and Staffordshire. The precise spot selected for the trial is a field by the roadside, at Alford Brook, Childs Ercal, on the estates of the Corbets, who received them from the Conqueror, and have retained them in their integrity to the present time. Should the result of the experiment be the discovery of workable coal, of which I confess I feel somewhat sanguine, it will open up a virgin field of mineral wealth in a district altogether new. The depth down will be considerable, and unfortunately, as it appears to me, a point has been selected on the estate at starting which will increase the depth by 300 ft. or more of strata. The spot may have other advantages, but it is a question whether they are sufficient to compensate for the additional time and outlay. With this exception, the place seems to have been well selected, and the experiment cannot fail to excite considerable interest, not in Shropshire only but in North and South Staffordshire. Mr. Bosworth seems to have provided himself with apparatus, including a small steam-engine, which is well fitted for the purpose. He commenced with a 9-in. borer, but is now working with one 5¾ in., and has gone down 180 yards without any accident beyond that of the breaking of a chisel, which had to be drilled out. To convey a clear idea of the importance of the experiment, it will be necessary to point out the relative position of the district with regard to the old and well-recognised coal fields on either side; also to say something of the nature of the strata already met with, and still to be passed through, before the coal measures are reached.

It is a spot surrounded by coal fields, some of which, it is true, are at considerable distances; but the more important of which, as bearing on the present prospect, are the Shropshire, North Staffordshire, Denbighshire, and Flintshire coal fields. With regard to one of these, that of North Staffordshire, I question much if its importance has been appreciated, or its capabilities developed to their full extent. South Staffordshire is every year diminishing, shrinking within itself, and showing more and more the poverty of its resources, whilst the coal fields of the northern division every day are becoming more developed, and are constantly exhibiting fresh indications that their resources are inexhaustible. There is no comparison as to the amount of coal-bearing strata of the two districts.

South Staffordshire, notwithstanding its thick coal, has but a total of 1800 feet of coal strata, with 65 ft. of that mineral; whilst the North has 5000 ft. of similar measures, with 22 seams of coal, having a total thickness of 94 feet, in addition to its very rich beds of ironstone, embracing the Silverdale Top mine, the Gubbin ironstone, and the Pennystone. Not much more than one-third, if any, of the three billions six hundred millions which the well-recognised portion of this invaluable coal field is admitted to contain has yet been worked, whilst undeveloped resources to a vast extent yet lie at workable depths beneath the Red Sandstone rocks. On the north-west side the boundary fault is one of dislocation, bringing down the marl of the Cheshire side against the carboniferous rocks on the south-east; but along a line many miles in extent they dip beneath the Permian and New Red Sandstone rocks on the western border of the field, giving rise to a well-founded hope that they may be met with in the direction of the Ercal boring.

The Oswestry coals have, I imagine, been partially denuded, as the Permians, which overlie the coal measures on the north, rest upon the millstone grit and carboniferous limestone, the foundation rocks on the south. The coal field of Flintshire, however, which is only separated from that of Denbighshire by an upthrow of carboniferous limestone and millstone grit, has a dip beneath the Red Sandstones of Cheshire, which, taken in connection with recent successful sinking along the valley of the Dee, affords strong reasons for believing that they are continuous in the direction of Market Drayton and Childs Ercal to North Staffordshire. The position, therefore, of these borings is a most important one, lying, as it does, between the productive coal fields of Denbigh, Flintshire, Lancashire, North Staffordshire, and Shropshire. Strike the coal here, and you strike a mineral field which will enhance the value of estates for miles beyond, and enrich the country generally by untold wealth for generations to come. An attempt in this direction is far more commendable than one which can only gratify curiosity, but where nine hundred and ninty nine chances out of the thousand are against finding a workable coal. The positions and relative order of the rocks both here and where they dip away from the old coal fields all round are favourable. On the Shrewsbury side the coal measure covering below the gravel, consists first, of their bedded sandstone; secondly, of red marl; thirdly, of sandstone; fourthly, of marl; fifthly, of sandstone; sixthly of marl; and, seventhly, of thick bedded sandstone. Sir R. Murchison, speaking of these sandstones, marls, and younger members of the coal measures, north of Shrewsbury, as early as 1839, said "It may be contended that, according to analogies elsewhere, carbonaceous matter formed upon the natural edges of such a basin would naturally thicken towards its centre; or, in other words, that as a certain amount of vegetable matter had been accumulated upon the shores of these ancient rocks, still larger quantities were probably washed down their shelving sides into the depths of a capacious bay or estuary, on the opposite limit of which we actually meet with other and highly productive coal fields, rising from beneath a cover of New Red Sandstone." Sir Roderick added—"I do not throw out out such suggestions as an inducement to proprietors north of Shrewsbury to endeavour to penetrate the thick and massive deposits

of which the overlying New Red Sandstone is composed; although it is by no means impossible that a coal field may there lie hidden, which, when the more accessible coal strata in other tracts shall have been exhausted, may prove of value to future generations. Such an inference is rendered more probable by the observations which show that a band of coal measures of the same age passing similarly upwards into the New Red Sandstone, and containing a limestone identical with this of the Shrewsbury plain, distinctly overlies the edges of the most productive of all the Salopian coal fields, and hence it is no strained inference that carboniferous masses equally thick may also be found expanding beneath the upper coal of Shrewsbury, though most probably at some distance from the outcrop." It is not so much the expansion, however, of the Shrewsbury field that I look forward to as the extension of the rich fields of North Staffordshire.—*Madeley, Salop, Oct.* 5. J. RANDALL, F.G.S.

NOTES ON THE WARWICKSHIRE COAL FIELD—No. II.

SIR,—In my first letter on the Warwickshire coal field I stated that it was not generally considered of much importance in comparison with others, inasmuch as its produce of coal and ironstone is comparatively small. But the value of this field cannot fairly be estimated from a consideration of its present capabilities. There lies hidden underneath many square miles of Permian a rich reserve of national wealth, which, sooner or later, is doomed to place Warwickshire in that enviable position which neighbouring and declining coal fields have so long held. This is not a question of mystical assumption of science, like many others which are now engaging public attention with reference to extension of coal fields. For 10 or 12 miles the characteristic coals and ironstones have been proved and worked to more or less extent along the outcrop, and all along this distance the seams are found to continue intact, dipping at right angles to their "strike" underneath the Permians, which latter overlap the coal measures in the direction of Birmingham. Although we firmly believe in the connection of the South Staffordshire coal field with the Warwickshire, we cannot as yet clearly identify any particular seam of coal or ironstone in common to both. This we can say, that the character of the seams, the ironstones in particular, are the same. The shale and fire-clays are of similar composition, and contain the same fossils. In course of time, when the whole thickness of the coal series shall have been proved, we shall, doubtless, find additional evidence to warrant our belief in the existence of coal and ironstones all the distance between the two coal fields. The greatest difficulty in our day would appear to be that of working and winning at such an enormous depth as is sure to be in the direction mentioned, but even this difficulty is daily being overcome. Greater depths are being wrought with safety, and the limit is not yet fathomed. If science scales, with its never withering banner, "Excelsior," mountainous difficulties with the same glorious successes as it has done during the past 50 years, we may with confidence hope to see the consummation we so devoutly wish for in the development of hidden treasures, and in the continued prosperity of the Midland Counties.

According to the mineral statistics just published by Mr. Robert Hunt, F.R.S., we find that Warwickshire stands thus:—

	1868.	1867.	No. of Collieries.
Warwickshire	Tons 624,859	880,850	16

In addition to this 14,795 tons of ironstone were raised, at a value of about 3698*l*. These figures bear but poor comparison with the produce of other counties, but we must remember that Warwickshire is not a manufacturing county, hence there is not that greedy demand for fuel. All it depends upon for consumption is the demand for house coals and brick kilns, which is very variable, and this against the competition of the North of England and South Staffordshire coal trade. With only this outlet for coals, we see no hope of the demand ever requiring any great increase in the supply. The desideratum of this coal field is consumption in part in its own field, by turning it into a manufacturing district.

We cannot see any weighty reason why this part of the county, with "verdure clad," should not be dulled by the smoke and gases emitted from numerous furnace plants and manufacturing works. There exist all the elements necessary for this in the shape of suitable coals and rich iron ore. There is much prejudice afloat as to the coals not being at all suitable for furnace purposes. We understand that many years ago a furnace was in blast, and after struggling on for a time in the most empirical manner it shut up as a failure. The reason of this, says tradition, was the fact of the fuel being so inferior. We do not believe this. We feel confident that part of the Warwickshire coals would be admirably adapted in their composition for smelting purposes. We know that part would not do, but this is the same in South Stafford. Not nearly all the coals are suitable for smelting, but those which are not can be used with advantage for manufacturing purposes. As much depends upon the management as on the quality of mineral. We could mention several instances where, owing to bad management, furnaces are working at a loss, notwithstanding the minerals used are of first-rate quality. The working of furnaces 30 years ago will not bear comparison with what it is to-day. Ignorant prejudice must now give place to scientific intelligence. Empirical management is ever ready to shift its own blame on to anything rather than bear it itself; hence such crude notions as the value of minerals. The Warwickshire coal field is in its mineral constitution a manufacturing one, and until it uses its means in a manner adapted to its constitution it will never rise to an enviable position. In its present *modus operandi* its coals, which in great proportion are comparatively inferior for house consumption, have to be sold at a moderately low price, and its ironstones are sent into Staffordshire at a figure 3s. or 4s. below what the same ironstones are really worth into furnaces. We wonder this question is not more popular. The advantages are patent. There would always be a certain demand for coals of a certain class, and the ironstones, which are as rich as any in Staffordshire, could be smelted on the spot, thus saving the carriage into other districts, which amounts to from 3s. to 4s. per ton.

If private mine owners are not bold enough to venture on the experiment we should recommend as being a feasible scheme that a trial furnace built on the most improved style be erected and carried on by the joint co-operation of mine owners, who would contribute their equal shares of cost and fuel. This is simply a suggestion in which there may be a germ of good. May it be so. More in our next.

Willenhall, Oct. 4. T. PARTON, F.G.S.

COLORADO—ITS PROGRESS AND PROSPECTS.

SIR,—In your admirable and well sustained Journal you have allowed, more than once, the subject of Emigration to be advocated, advancing thereby the interests of a large class of your fellow-citizens, desirous of founding new homes for themselves and families; and the *Mining Journal* has been the first recognised organ of public opinion to present to the mass of your countrymen the vast preeminence of the new State of Colorado, beyond all other discovered and known locations, through its natural resources, geographical position, and wondrous salubrity of climate, and now made so accessible by the completion of the railway to its capital city, Denver.

I cannot but feel that you will gladly hear of the full corroboration of the statements made from time to time in your columns, by others who have written since from Colorado, and that its prosperities are increasing on a wonderful scale; emigration fast flowing thereto, new settlements springing up, and every industry flourishing to a remarkable degree; railroads being completed, whereby two through lines will be competing early in the spring of 1870, causing a great reduction in the fare. On October 1 the branch road from Cheyenne to Latham, half-way to Denver, was advertised as open to traffic; all the iron for the other half (52 miles) lying ready at Cheyenne, and would be down in a few weeks, and thus by Christmas will be thrown open to the thousands now suffering from anxious responsibilities, weighed down with the depression of decreasing incomes and increasing cares, a land of which it can be truly said—"None but itself can be its parallel;" offering new honey, so full of every natural resource, as beyond all risk, must bring back to industry hope and happiness.

The theme of Colorado is becoming a popular one in England. Books have been and are being written, lectures given, and in the early spring of 1870 there is no doubt a steady tide of immigration will flow into the State, and a large and influential class wend their way from England. It is too late in the year to leave now; early in the next it is my intention to establish an agency in London, for the purpose of giving every advice, information, and assistance to any parties emigrating, during the three months of March, April, and May, of which due publicity will be given through the advertisement columns of the *Mining Journal*. Some few years hence, when Colorado will be known and spoken of as one of the most prosperous and powerful of our States, you may again allude to its resources, and it will be remembered with a justifiable pride that to-day, in its infancy, you permitted the interests of Colorado to be advocated in the columns of your Journal.—*Ostend, Oct.* 5. ROBERT H. LEESE, Ex United States Consul.

ACADIA IRON AND CHARCOAL COMPANY.

SIR,—A correspondent asks, through the Journal, whether the above company is still in existence? I believe I am correct in stating that it was re-incorporated last year as the "Intercolonial Iron and Steel Company," and that Mr. Livesey is now in Ottawa, to obtain a contract from the Commissioners of the Intercolonial Railway for all the steel required for that work. ACADIENSIS.

Halifax, Sept. 23.

NOVA SCOTIA GOLD FIELDS.

SIR,—A general discouragement still oppresses the gold mining industry, but without just reason—for, although the aggregate yield is falling off, it is still well sustained in proportion to the number of workers. The subjoined official returns for the month of August give evidence of continued vitality.

WAVERLEY.—Operations, on a limited scale, are confined to the properties of the Boston and Nova Scotia Company, the De Wolf, and Mr. Bürkner's claims. The new lodes recently opened on the two last continue to look promising. The Lake Major Mill reports 13 ozs. 9 dwts., from a crushing of 61 tons 14 cwts. The mills in this and nearly every other district have been idle for several days, on account of the drought.

OLDHAM.—This district is beginning to recover favour after nearly four years' neglect. A single area—three-quarters of an acre—was recently sold for 600*l*. sterling. A lot of 5½ tons of quartz, from the White Head claims, gave 13 ozs. 15 dwts. 14 grs. It was the result of 21 days' labour.

WINE HARBOUR.—All the mills in this district were stopped during August for want of water. The Orient property has been sold off by the sheriff, and was bought in only for $700. The Provincial Mine is expected to share a similar fate, though it must realise a better price. Negociations are still pending for the sale of the Napier Mine to a French company. The Eureka Mine, under development by Mr. C. F. Eschweiler, a German mining engineer, has lately produced some ore which averaged 5 ozs. to the ton. The lode, however, is small—only 3 in. at the greatest width.

SHERBROOKE.—The Palmerston Company lead off with 123 ozs. 15 dwts., from 150 tons; the Dominion Company produced 107 ozs. 3 dwts., from 418 tons, still from the 18 ft. lode; the Wellington Company gave 89 ozs., from 284 tons; and the smaller properties 103 ozs. 3 dwts., from 541 tons. The Wellington Company have purchased the adjoining northern areas of the New York and Sherbrooke Company, into which the gold was dipping, but which could only have been reached by the latter company through sinking 300 feet.

ISAAC'S HARBOUR.—The Mulgrave Mine is now being worked on private account, and with apparently satisfactory results.

MONTAGUE.—Developments are still confined to the properties of Messrs. R. G. Leckie and Co., T. De Wolfe, and Lawson Brothers. The latter gentlemen are English mining engineers. Lack of water affected this district, too; consequently, no crushings are reported for last month.

RENFREW.—Work is almost exclusively confined to the Ophir Mine. In 38 months, ending July, 1869, this property, with a daily average of 100 men, produced 14,127 ozs. of gold, from 16,206 tons 7 cwts. of quartz, the actual net profit on which was 30,000*l*. sterling.

TANGIER.—At Mooseland, or Old Tangier, but little work has been done all the summer. At the Harbour operations have been resumed on the mine formerly belonging to the New York and Nova Scotia Company, and approvingly reported upon by Prof. B. Silliman. It is now English property, and called the Burlington.

LAURENCETOWN.—Developments are still limited to the properties of the Westminster Company and E. M. Strange.

UNIACKE.—The Uniacke Company (of Boston) sent up 180 ozs.; the Montreal Company (of Montreal), 35 ozs. At the mine of the former a poor fellow was killed last week by attempting to jump into the bucket in its descent. He fell a depth of 65 ft., had both his arms broken, and was otherwise fearfully injured. He died 30 hours after the accident.

MUSQUODOBOIT.—This comparatively new district has lately acquired deserved importance, although only two properties are under actual development. The Hyde property was the first opened, and the August crushings averaged 2 ozs. to the ton. The Bürkner Mine, though second to be developed, was the first to have a mill in operation, besides being the first in extent and productiveness. Two miners who had made a discovery on this property early in August were given the choice of a round sum as a reward, or seven weeks to strip the lode for a length of 60 ft., and $50 on giving up possession. They chose the quartz, and, at an expense of 26*l*., earned 262*l*. within the time limited. They raised 18½ tons of quartz, which produced 63 ozs. (worth 252*l*.), and then got the bonus of 10*l*. The lode varies from 7 to 15 in. in width, and has been traced a distance of 1800 feet.

GOLD RIVER.—The Exploration Company have ceased work for the season, and will re-organise as a mining company, to resume operations next year. During the last week of his direction, Mr. Michel discovered a rich boulder from a lode 18 in. wide. The assays by Dr. Dana Hayes of the ores of this district confirm the mechanical assays made by Mr. Michel. Visible gold has been traced in the lodes for a distance of 2500 ft., and the even distribution of the precious metal here is a peculiar feature already remarked upon.

INDIAN PATH.—Some experiments made with the soil and gravel from the Waddelow and Macdonald property, in this district, gave 4 dwts. to the ton of 2000 lbs. The distance of the mine (three-quarters of a mile) from the mill rendered the experiment costly, but if carriage could be saved the crushing could be continued with profit.

THE OVENS.—A Canadian Company are the sole workers in this field. No results of any importance have been attained, but neither money nor intelligent perseverance will be spared in trying to make the venture a success.

YARMOUTH.—This district, only opened during the winter, has now one small mine, equipped with a mill, in successful operation. The monthly product is about 40 ozs.—*Halifax, Sept.* 23. ACADIENSIS.

THE AUSTRALIAN UNITED GOLD MINING COMPANY.

SIR,—Having kindly allowed me room in your Journal to reply to questions put by shareholders in the above company, I will thank you to allow me further space to insert a few extracts from Mr. Kitto's private letter to me per last mail, as I think they may prove acceptable and gratifying to the shareholders.

"I have been in a regular fix for nearly a month, in not being able to procure timber for the platform for the high tramway; the roads in the forest are so bad that the saw-mill people inform me that it has been impossible to bring timber to Fryerstown. This state of things is very aggravating, as I cannot crush until the timber comes in. The people pledge to have it in to-morrow; if so, I shall commence crushing in a few days, and not stop again, I hope, for twenty years at least.

"You will see an account of the works in my official report to the directors. Mr. Hicks, from Ballarat, one of the directors of the Fryers Company, went with me last week to visit the Sir Roderick Mine, when he informed me it was his opinion that it (the Sir Roderick) was the best piece of ground on the line.

"I am crushing 300 tons of stone for Small and Co., which looks like 1½-oz. stuff. If you have done nothing with the Sir Roderick, do not until next mail.

"We have any quantity of water in Lamb's shaft, which is now nearly 90 ft. deep. The Deep Lead engine is pumping from the shaft. We this day struck gold in the bottom of it. Hilton and Co. cleared off 40 tons on Saturday, for 63 ozs. 15 dwts. of gold.—R. L. M. KITTO."

In addition to the above, Mr. Kitto informs the directors that he will be in a position to produce profits to pay a dividend by the end of the year.—21, *Craven-street, Strand.* HENRY WM. LAMB.

DIAMONDS AND OTHER GEM STONES IN AUSTRALIA.

SIR,—I have received the enclosed letter from Dr. Bleasdale, of Melbourne, upon the subject of the recent discoveries of diamonds in New South Wales, with a request that I would forward it to you.

Dr. Bleasdale was one of the first to say that diamonds and other precious stones would be discovered in Australia in payable quantities; and his opinions and statements may be accepted as being in every way reliable. GEORGE VERDON.

8, *Victoria-chambers, Victoria-street, S.W., Oct.* 4.

SIR,—It is now beyond doubt that valuable diamond mines exist in the district of Mudgee, in the heart of New South Wales, for the number of diamonds already received in Melbourne from the Cudgeegong Creek, which skirts the plain whereon the little town of Mudgee stands, amounts to some hundreds. Many of these have been examined by me, and nearly the whole by both Mr. Crisp, the well-known Melbourne jeweller, and myself together, and found to be of more than average quality taken generally, and of weight varying from a quarter of a grain to 5⅛ carats, the last being the largest I have yet verified. Being an exceptionally fine crystal, it was purchased from the bank of New South Wales yesterday for 111*l*., and is to be sent by the outgoing mail to Mr. Harry Emanuel for the purpose of being cut, and perhaps exhibited for a short time. The importance of this subject I trust will be a sufficient reason for my asking a little more space in your valuable columns, for while it is interesting to many to learn something of the mineral wealth of this favoured portion of the empire, there is always, at the same time, fear of such information misleading the speculative and sanguine. It may be as well, therefore, to place the actual state of the diamond mines before the public.

This district of Mudgee, one of the earliest of Australian gold mines, and at no time very rich, contains much good pasture land, nearly all of which was purchased long ago, and at a time when the watercourses were sold along with the land, and became private property. The mining for gold and diamonds will thus have to be carried on upon private property for the most part.

On no lands alienated from the Crown prior to the passing of the New South Wales Mining Act, 1861, can a spadeful of gravel be dug without permission from the proprietor, who in most cases is said to dislike no living thing more heartily than 'the digger.' There are in existence two Melbourne companies, and most probably one in Sydney; but only one, the Australian Diamond Mines Company, is yet at work. Consequently, whatever has yet been done cannot be described as better than 'prospecting.' Moreover, there is but one small machine upon the Cudgeegong Creek, and the material operated upon is mostly the refuse 'spoil-heaps' left by diggers in former years. Collections such as these, left on the spot where the gold was washed, may be exceptions in the way of richness, and the reports of discoveries might mislead were this not stated.

Having said thus much by way of *caveat* against over-sanguine expectations, I will add a word by way of accounting for the diamonds, and, indeed, all their commonly associated gems, such as sapphire, ruby, topaz, &c., having been so rarely found hitherto. Much is due to the ignorance of even the most intelligent of our miners, and a good deal to the want of suitable machinery. As to ignorance, it is now beginning to be dispelled, while at last a machine (Mr. J. Hunt's) has reached us which is capable of doing its work in a manner hitherto not known on our mines. Its principle is based on the different specific gravities of stones and minerals; and the mechanical appliances used to compel the various matters to take up their specific places in the washing table (a sieve) are at once single and efficient. It is one of the multitudinous contrivances for washing. To this and such like machines companies as well as individuals must look for results both in gold and diamonds, where mining for diamonds is the primary pursuit. Fortunately, these machines, though patented, are neither very expensive nor complicated, and so easy to work that, with a fair supply of water, two men and a boy might pass 20 tons of gravel through one in a day.

This is the brighter side of our prospects, the trifling cost of machinery and labour. I fear I am trespassing too much on your columns, and will only now add my own reason for writing to you at present, which is a fear that too much weight may have been given to my name and those of one or two others—notably Mr. Crisp's—in relation to this new and hitherto neglected source of colonial wealth. I should regret indeed to be the means of inducing any one to lose a shilling on the strength of anything I can say about colonial mining. Personally I neither have, nor never had, any pecuniary interest in any speculation or company, though I have long taken an active scientific interest in developing our gem mines. JOHN J. BLEASDALE, D.D., F.G.S.

St. Francis, Melbourne, Aug. 13.

THE WITHBURN LEAD MINING COMPANY.

SIR,—From a report to the Secretary of the Withburn Mining Company, I have pleasure in forwarding you the following observations on the mining interest of that company. First, respecting the mines:—

Two main points seem to comprise the success of the mines—the value of the ore existing in the mine workings, and the careful and economical search after the missing east and west vein. The yield of ore in the east and west vein has never been better than at present, although it is, in many places, of a diffusive character, and liable to give deceptive results in estimating the quantity. The estimated yield of ore per fathom of work done has never been realised in the ore-house, and hence have arisen various explanations. But the facts seem to be that the vein stuff actually got last year has not been dressed, but lies in part upon the trimmings, and the ore really dressed is not or only in part of that upon which the estimate is founded. If the remaining portion be dressed there seems no reason to doubt that the yield will be equal to the estimate. The Blue Rock vein shows remarkable promise. The ore lies in a rib, well defined and concentrated in character. The specific gravity of a good specimen of the lead ore gave 7·4. Reckoning, on an average, 7 each square fathom, 1 in. thick would yield 10 cwts. of ore. The captain wisely reckons 8 cwts. to the inch, and his estimate of 24 cwts. per fathom for the working as it now stands is certainly below the truth.

SEARCH FOR THE EAST AND WEST VEIN.—The captain's statement, that he has found the east and west vein is, no doubt, true, and though barren of ore I fully expect, if followed across the 9 fathoms of barren country, and a heading driven along the 4 ft. vein, that the east and west will be found.

THE ORE SHAFT.—The ore shaft is supposed to lose a considerable quantity of galena. There would be no doubt that from the friable nature of sulphide of lead, especially after exposure to the air, a portion is crushed to powder; but, since the shaft is so irregularly driven as not to admit of any skip or bucket arrangement, I am not prepared to suggest any plan beyond the bagging of the powdered pieces, which has lately been introduced with manifest profit. At the foot of the rise in No. 2 a sump should be formed in which the pulverised galena from the rise might settle.

WATER SUPPLY.—Water being the only motive-power, and since the supply frequently fails, and notably so at the present, it is of the utmost importance to economise it. To that end I would suggest that the rise of water used to remove the refuse of the jigging tubs be turned to better use; also, that the dam be enlarged and cleared from the debris of winter floods, and that the supply from Browning's Well and from the neighbouring beck be directed into the dam, the latter at as low a point as possible.

LABOUR.—The organisation of labour on the D. F. is unsatisfactory. There is not sufficient check on the industry and care of the men. The principle should be adopted of paying for the amount of ore produced. Some difficulty would be experienced on account of the varying quality of the vein stuff, but they are not insuperable, and the company and men would be gainers thereby. Each man being a gainer by the exertion and carefulness of the rest would prove an invaluable safeguard against idleness and waste.

SLIME PITS.—There seem two radical faults here—one the water-flows being too rapid, the other being in reality a stream. The rapidity of the stream makes a channel through the water, after the manner of an ocean current. At the entrance of the stream should be fixed a board, furnished with strips of wood, to spread the water evenly, and proportionately diminish the impetus and promote subsidence. Also, the pits should not be allowed to be full, since the rapidity of flow through the pit is inversely as its capacity. The arrangement for conveying the slime from the pits to buddles is lead. The buddle should be below the level of the pits, and the slime flow by its own gravity.

THE ORE HOUSE.—I should recommend at present that the ore be weighed weekly, and that a tabulated record of each weighing be kept,

Willenhall, Oct. 5. G. HOLT, F.R.G.S.

[For remainder of Original Correspondence, see this day's Journal.]

THE GOLD FIELDS AND MINERAL DISTRICTS OF VICTORIA.

The very valuable statistics, and other official information, from time to time issued by Mr. R. BROUGH SMYTH, the Secretary for Mines for the Colony of Victoria, have afforded the readers of our Journal ample opportunity for judging of the vast amount of mineral wealth which this division of Australia possesses, and he has now completed a handsome and useful volume*, adapted to the requirements of the general reader. Mr. Smyth first describes the geographical position of the several districts, and then the principal rocks which are most prominent in each, the description being rendered peculiarly interesting by the introduction of historical notices, notices of the movements of the population on the gold fields, modes of occurrence of gold, gold working, mining laws, and miscellaneous minerals. More than ten years since it was suggested that the interests of the colony would be promoted by the publication of scientific papers on the plan of the Memoirs of the Geological Survey of Great Britain, and materials which had been collected were actually prepared for press, but at this stage it was ascertained that the scheme was not viewed favourably by the gentlemen from whom contributions were expected, and it was at length reluctantly abandoned, and the colony has been dependent upon scientific journals in Europe for the publication of useful papers, full of valuable facts, contributed by the heads of the scientific departments in Victoria, and though perhaps, as Mr. Smyth remarks, it would have been more beneficial to colonial interests had they been published in the colony, there is neither cause for serious complaint nor room for much regret. They have operated beneficially, and they are sufficient proofs that those occupying responsible positions have not been idle. Mr. Smyth very truly observes that the advantages which would have been gained by the publication of scientific papers after a regular system would have compensated for any inconveniences which might have been caused to the writers. The results of their labours would have been fairly before the public, each person would have enjoyed similar privileges, the papers would have been illustrated by appropriate drawings, diagrams, and plans, a groundwork would have been laid for a physical atlas, the public would have had easy access to all the various sources of information, and the cost of printing and publishing large volumes of useless figures, and masses of irrelevant, uninteresting, departmental correspondence would have been saved.

It is shown that since the discovery of the gold fields, in 1851, to the end of last year the mineral produce of Victoria has equalled nearly 150,000,000*l*.; and although the gold, of course, forms the largest item in the list, tin figures for 209,964*l*., copper for nearly 6000*l*., antimony for 37,160*l*.; and coal, lignite, kaolin, flagging, slates, magnesite, and silver also appear in the list, as well as a few diamonds and sapphires. Mr. Smyth describes the colony of Victoria as divided naturally into three parts, each dissimilar as regards climate and soils. The Great Cordillera, which extends southwards from Cape York, has a culminating point at Forest Hill, and it runs thence south-westerly and westerly through the Victorian territory to St. Clair, where it diverges southwards and forms the dividing range between the waters of the River Yarra and those flowing to the La Trobe. It is traceable thence southwards for the greater distance by a well-marked watershed to Wilson's Promontory, and onwards under the sea by a chain of islands to Tasmania. A great spur stretches westward from St. Clair to the Grampians, whence the line is broken and disconnected. The coast line throughout the whole eastern extent of Australia conforms rudely to the line of the Cordillera, and the like configuration is observable in Victoria. The Cordillera, from Forest Hill to St. Clair, is composed principally of palæozoic rocks. Near Omeo there are masses of granite, porphyry, and limestone, and patches of middle palæozoic and trappean rocks; but its course is nearly altogether through the Silurian strata. At Baw-Baw, the granite is found abutting on the Silurian claystones. The western side of the great range is composed of plutonic rocks, and the eastern of sedimentary strata, the summit of the range following the boundary of the rocks, a peculiarity observable in other parts of the colony where these rocks occur. Further southwards the line extends through carboniferous rocks and some patches of porphyry, until reaching Wilson's Promontory, where a mass of granite is found, with dykes of quartz, and containing large crystals of tourmaline. A belt of Silurian claystones lies between the granitic area and the carboniferous rocks. It is highly probable that the granite of Wilson's Promontory is connected with that of Baw-Baw, notwithstanding that sedimentary rocks are found between the two areas. In the same way, and with equal precision, Mr. Smyth describes the entire mineral district, and the characteristics observable in the various parts.

It is to be regretted that the author has to complain that the miners have been guilty of wanton destruction of the forests wherever they have gone; the seats of their labours are marked by the trees having been cut down, leaving acres of bare short stumps, where a few years ago there was a stately growth of eucalypti. He remarks that there has been so much waste, and so much almost wanton destruction, that no time should be lost in repairing the damage, if, indeed, there be yet time to repair it with any hope of the new growth being available before some of the mines are abandoned. The general interests of the miners have been sacrificed to the greed or caprice of those who, until lately, ravaged the

* "The Gold Fields and Mineral Districts of Victoria, with notes on the Modes of Occurrence of Gold, and Other Metals and Minerals." By R. BROUGH SMYTH, F.G.S., &c. Melbourne: John Ferres, Government printer. London: Trübner and Co., Paternoster-row.

beautiful forests as if the loftiest tree were the growth of a single night, and was placed there merely to be irreparably damaged or destroyed as soon as found. A giant of the forest had been killed in order to furnish a sheet of bark, and the smaller kinds have been burnt for the purpose of boiling a kettle. Timber for the mines at Ballarat is now brought from Smythesdale, and in a few years, unless some change be made shortly, it will be impossible for the miner to pursue his labours even in the richest districts. The approximate cost of the props and cap-pieces, laths, slabs, sawn timber, and firewood used in the mines during the year 1867 was 561,123*l.*, and the importations from abroad of soft wood timber in deals and sawn stuff for building and other purposes from January, 1852, to the end of June, 1867, reached the enormous sum of 8,392,551*l.* Surely these statements merit consideration. By a small timely outlay the colonists could produce in the State forests soft woods sufficient for all their wants. Nearly all the conifers grow very rapidly in Victoria, and, perhaps, it is correct to say that none of the more valuable timber trees of the world would fail to thrive in appropriate localities in the mountain ranges of the colony.

Gold-producing countries are commonly supposed to be poor and barren, the outcropping bare rocks, which usually appear in the vicinity of shallow alluviums, being considered the only accompaniments of rich placers, whilst the poverty of the soil is compensated for by the gold dust, which sparkles in the sands of the streams. The miners of Victoria, as Mr. Smyth points out, have shown the unsoundness of this long-established theory. Side by side with the gold miner is seen the farmer busily ploughing rich chocolate soils, which yield heavy and good crops. In the midst of a field of yellow corn there rise the engine-house and chimney, which mark the spot where the miner has sunk a shaft for a deep lead, and on the slopes falling towards the sites of puddling machines and sluicing operations one beholds rich vineyards and well-stocked orchards. Near even to some of the quartz workings there are gardens containing fruit trees, which yield more to the cultivator than he could hope to gain in the same way in any other country; and scarcely a patch of land is too poor for the Chinese gardener. If he have water and a good market he will make the bare rocks grow green. In order the better to estimate the extent of the actual and probable mineral resources of the colony, Mr. Smyth gives an account of the areas occupied by the more important rock formations. The results in square miles for the three natural divisions of the colony are—

	Murray district.	Western district.	Gippsland.	Total.
1.—Granites and other Plutonic rocks	1,000	700	500	2,200
2.—Sandstones, claystones, mudstones, and metamorphic rocks and slates belonging to the Lower Silurian, Upper Silurian, and Devonian ages	20,000	2,100	5,700	27,800
3.—Carboniferous rocks, including schists likely to yield petroleum and rock oils, and excluding the older carbonaceous rocks	—	2,500	700	3,200
4.—Basaltic and volcanic rocks	800	9,500	(?)	10,300
5.—Tertiary rocks, excluding the thin alluviums, volcanic rocks, and gold drifts	26,500	1,200	900	28,600
6.—Limestones of all ages	50	30	250	330
7.—Unexplored—much consisting of granites and rocks belonging to the Lower Silurian age	5,350	4,270	4,781	14,401
Total	53,700	20,300	12,831	86,831

The total—86,831 square miles—is the area of the colony. One-third of the whole area may safely be assumed as occupied by gold-bearing rocks, all of which is easily available to the miner, and which he may prospect with reasonable hopes of success, and without running counter to any theory not already exploded. Mr. Smyth considers that there is no necessity for the miners of Victoria to waste their time in what might result, so far as their interests are concerned, in unprofitable investigations. Those amongst them who have formed domestic ties have settled permanently in the principal mining centres, where they can live comfortably, and where they can readily find employment at good wages if they be not successful in discovering gold in their own claims. So many rich gold fields have been opened, and so much land made ready, as it were, for their operations, that they do not readily forsake their homes to prospect new and distant and difficult tracts. But there is an unsettled, discontented, adventurous class which is not to be restrained by any ties. Bold, accustomed to independence, and hardy and industrious, they are nearly always well off, but the very qualities which would lead to success and wealth—if they could live without excitement, and bear the monotony of mere daily labour—lead them to forsake certain profits in Victoria for the bare chance of something better in places where sober, thoughtful men would never think of risking their lives and fortunes. It is to such men that we owe the most valuable discoveries, and they belong to a class which, as a rule, profits the least by them when they are made. They no sooner discover a new gold field than they pack up their tents and blankets, and move off to new tracts.

The manner in which Mr. Smyth records his facts gives an interest to the volume, which in so eminently practical a work was scarcely to be expected. The author wishes it to be understood that he is merely a compiler, but no one can read his elaborate production without acknowledging that it has far more claims to originality than many which are issued as entirely new. The value of the work is also much enhanced by the many beautiful engravings, diagrams, and sections with which it is illustrated, and, as a whole, Mr. Smyth's exhaustive work may well be regarded as the most complete and useful upon mining in Victoria which has been published either in England or the colony.

Quarterly Journal of Science.—The October number of this magazine will be found especially valuable to many of the readers of the *Mining Journal*, since almost every article it contains has a close connection with their ordinary occupations. Mr. Crookes supplies an interesting article on the Spectral Phenomena of Opals, and there are others on Coal Washing, on the Teaching of Natural Science at the Universities, and on the Mineralogical Resources of Ireland. The "Chronicles of Science" are likewise more than usually interesting. The archæological section has an interesting reference to the Sutherlandshire gold deposits, with speculations as to the collection of the gold in prehistoric times amongst other notices. In the botanical section there is a notice upon the relative effects upon various trees and plants of the noxious gases from chemical works, showing what can best be grown in such localities. In the chemical section there is Forbes's analysis of jargon. In the engineering section are notices of the Pacific Railroad, the French Atlantic Cable, the Channel Passage, and the Utilisation of Small Coal; and the geological and palæontological, meteorological, mining and metallurgical, physical, and zoological sections are equally attractive.

Popular Science Review.—The October number of this review contains original articles—Experimental Illustrations of the Modes of Determining the Composition of the Sun and other Heavenly Bodies by the Spectrum, being Dr. Miller's Exeter lecture; What is Bathybius? by Prof. Williamson; Are there any fixed stars? by Mr. Proctor; Kent's Hole, by Mr. Boyd Dawkins; the Lingering Admirers of Phrenology, by Prof. Cleland; the Anatomy of a Mushroom, by Mr. C. Cooke; and the Chemistry of a Comet, by Dr. Divers. The reviews and scientific summary are of the usual interesting character.

FOREIGN MINING AND METALLURGY.

The demand for coal maintains a certain importance, and the extraction has resumed a certain activity. The consumption developes itself gradually, as is usually the case at this period of the year, but the improvements which have taken place, although very appreciable, are still far from securing to the trade that prosperity which results from a serious revival of industry in general. The rate of freight from Charleroi to Paris has remained at 7s. 6d. per ton, although the general anticipation was in favour of a fall; this persistent firmness in freights is attributed to the want of plant on the railway lines, which has compelled the trade to submit to the demands of the boat owners to a greater extent than it would otherwise have done. The *Houilleur*, a Charleroi journal, observes on this subject:—"The deliveries by railway are as important as the supply of *materiel* would allow, but trucks generally have made default. The Belgian State system has especially treated the Borinage scurvily. The Jemappes and St. Ghislain stations receive about one-sixth of the trucks required, and there is little doubt that an almost equally deplorable state of things prevails in the other Belgian basins. There are here some collieries obliged to deliver to industrial establishments from 30 to 40 tons per day, and often from a want of trucks they cannot forward anything at all. The Coalowners Committee has just forwarded to the Minister of Public Works bitter remonstrances on the immense injury which the want of wagons occasions to the Borinage. May these complaints secure a substantial improvement in the state of affairs."

Annexed is a statement showing the imports of pig and cast-iron into France during the first seven months of this year, as compared with the corresponding period of 1868:—

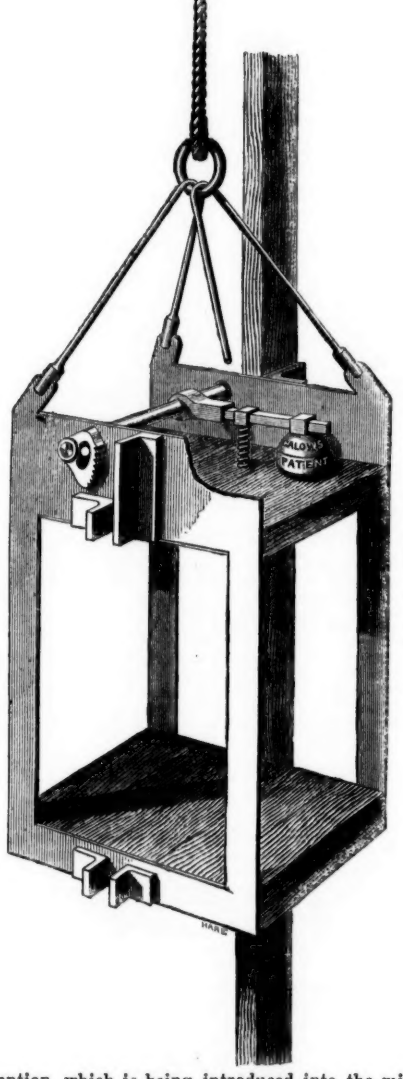
	1869.		1868.
Imported free of duty .....Tons	78,873	.....	56,299
Imported for shipbuilding	1,300	.....	962
Imported with payment of duties.....	5,707	.....	12,978
Total	85,880		70,239
As regards iron and plates, the totals stand thus—			
Imported free of duty .....Tons	29,498	.....	26,837
Imported for shipbuilding	4,895	.....	5,798
Imported with payment of duties	6,183	.....	6,624
Total	40,576		39,259

The total exports by warrants during the first seven months of 1869 of pig, iron, and plates amounted to 105,441 tons, as compared with 83,230 tons in the corresponding period of 1868. The direct exports of pig, iron, and ironwork from France in the first seven months of this year amounted to 22,361 tons, against 11,898 tons during the corresponding period of 1868. The imports of minerals into France in the first seven months of this year amounted to 346,392 tons—from Belgium, 74,487 tons; from the German Association, 49,164 tons; from Spain, 53,725 tons; from Italy, 36,658 tons; from Switzerland, 217 tons; from Algeria, 130,499 tons; and from other countries, 1571 tons. The advices received from the Haute-Marne, the Moselle, the Meurthe, the Ardennes, the Nord, &c., are of the most satisfactory description. Everywhere much difficulty is experienced in meeting the orders which come to hand, and even in the Haute-Marne there will be no dead season this year. Iron is well maintained in price. Rolled, from coke-made pig, is quoted at St. Dizier at 8*l.* 4s.; and special iron, 9*l.* 8s. per ton, first-class. Mixed rolled iron (merchants' bars) has made 8*l.* 12s. to 8*l.* 16s.; ditto (sheets), 9*l.* 16s. per ton. Rolled iron, from charcoal-made pig, 9*l.* 4s. per ton; first-class sheets, 10*l.*; machine, No. 20, charcoal-made, 10*l.*; mixed ditto, 9*l.* 4s. to 9*l.* 12s.; ditto, coke-made, 8*l.* 16s. per ton. The foundries of the Haute-Marne continue well employed, but prices remain stationary; the activity which prevails in all the works should bring about an improvement in quotations, but this has not been the case at present. Refining pig maintains a good current of affairs in the Moselle and the Meurthe; white pig, 2*l.* 12s. 4d. to 2*l.* 13s. 2d. per ton; and speckled pig, 2*l.* 14s. 10d. per ton. The forges and foundries of the Moselle and the Meurthe display considerable activity, in order to execute the contracts on hand, and some want of labour is experienced. MM. de Wendel, are fitting up some Siemens furnaces. The Moselle and the Meurthe not being able to meet all the orders which are addressed to them, the rolling-mills of the Ardennes have obtained one or two additional outlets for their products. Iron has been maintained in the Ardennes at 8*l.* 4s. to 8*l.* 8s. per ton. The mechanical concern known as J. F. Cail and Co. has just held its annual meeting at Paris. M. Cheilus, one of the managers, read a report, from which it appeared that the operations of the various establishments of the company in Belgium and the North of France have proceeded during the past exercise on favourable conditions—even more favourable than those of the preceding year. The Paris establishment, which was destroyed by fire two years since, has regained its full activity. The works undertaken by the company in connection with the construction of the Kiew and Balta Railway are still prosecuted favourably, and the contract is expected to be completed towards the end of this year. A dividend has been declared for 1868-9 at the rate of 16 per cent. per annum; 5 per cent. was paid on the 1st inst., and the remaining 11 per cent. will be distributed on April 1, 1870. Arrangements will have to be shortly made for the reconstitution of the company, the duration of which will expire on Sept. 20, 1870. A special meeting will be called shortly to consider this question.

The state of the Belgian iron trade remains much the same. Great efforts are being made by some of the Belgian works to increase their means of production. Thus, the Thy-le-Château Company expects to increase its make of rails from 20,000 tons to 40,000 tons. The house of Dorlodot is about to increase the number of its puddling and re-heating furnaces at Châtelineau to 80. Prices continue to display great firmness in Belgium. The Monceau Blast Furnaces Company has been paying this month 1*l.* per share on account of the dividend for 1869.

At Havre, Chilian copper in bars has been rather weak, in consequence of the advices from Valparaiso leading to anticipations of rather important deliveries; the last quoted prices were 68*l.* **8s. to 69***l.* 12s., Paris conditions. At Paris, Chilian in bars has been quoted** at 69*l.* 8s. per ton; ditto ingots, 74*l.* per ton; ditto tough English, 73*l.* 4s. per ton; Corocoro minerals (pure copper), 72*l.* per ton. At Cologne the article has found an easy outlet of late. At Berlin there has been but little demand, and transactions have been comparatively insignificant. At Hamburg relatively low prices have been current. On the Dutch markets prices have not varied. The French and German tin markets have presented an attitude of reserve. At Hamburg the article has been comparatively neglected, in consequence of the public sale in Holland, of which we hope to afford some details next week. Advices from Amsterdam report that the stock of Banca at that place at the close of September amounted to 132,581 ingots; the stocks at the corresponding periods of 1868 and 1867 were 170,331 ingots, and 188,303 ingots respectively. The deliveries in September were 10,399 ingots, against 12,170 ingots in September, 1868, and 9786 ingots in September, 1867. The total deliveries from Jan. 1 to Sept. 30 this year were 74,572 ingots, against 98,317 ingots, and 84,066 ingots in the corresponding periods of 1868 and 1867. The quantity of Banca under sail at the close of September was estimated at 42,600 ingots, against 26,300 ingots and 39,200 ingots at the corresponding periods of 1868 and 1867. The stock of Billiton at the close of September was 10,714 ingots, against 6209 ingots at the close of September, 1868. The price of disposable Banca and Billiton at the close of September was 78½ fls. and 77½ fls. against 53¾ fls. and 52¾ fls. at the close of September, 1868, and 54¼ fls. and 53¼ fls. at the close of September, 1867. There has been scarcely any change of late in lead. Zinc has remained quiet.

CALOW'S NEW PATENT SAFETY HOIST APPARATUS.



This invention, which is being introduced into the mining and manufacturing districts by the makers, Messrs. Bailey and Co., **of the Albion Works, Salford, Lancashire, is for preventing accidents in hoists of mines, works, hotels, &c. This invention was exhibited at the meeting of the Iron and Steel Institute, at Middlesborough-on-Tees, and it attracted much attention. There are already twelve at work at the eminent firm of Bolckow and Vaughan. Messrs. Bell Brothers, another well-known firm in the North, have it to 16 cages, and the Clay Cross Colliery Company have it to 20, all having given great satisfaction, and have saved lives and property on more than one occasion.**

The great beauty in this invention is its extraordinary simplicity. Practical engineers know that the chief objection to safety apparatus hitherto invented has been this—they cannot trust to the old principle of safety-cages, on account of the friction and destructive action: it is well known that every time the cage descends and ascends the machinery is acted upon four times, which at modern collieries would amount to some thousands of times in a day. Hence the great objection, because they cannot be kept in order without considerable care and expense; but Mr. Calow has, through the result of six years' experience, overcome the objection in every shape, for by his arrangement of mechanism it is *not* brought into play by the mere slacking of the rope, but when the rope breaks only, the rope not being in any way connected to the apparatus. It may be asked, Where is the motion obtained? There is its beauty and simplicity, likewise its strong recommendation. Anyone having studied the difference between a falling body and the same body being let down a shaft at the greatest speed it is possible for an engine to accomplish, will find a great difference in their respective speeds. It is in the difference in the speed wherein the motion is obtained, so that the cage has to gravitate before the machine is acted upon. It will be seen from the illustration that a bar has on it a lever weighted; this weight keeps a spiral spring compressed. When the cage becomes a falling body—that is, falls at 16 feet in the first second—the support for the spring ceases to exist, and it becomes of a greater length, thrusting the eccentric jaws or grips into the slides, and effectually preventing the cage descending.

LUCRATIVE INVESTMENT.

[From Bartlett and Chapman's *Investment Circular* for October.]

It is our custom to devote this page of the *Investment Circular* to a review of the most eligible investments then in the market, with the view of suggesting to our readers the safest and most profitable channels in which they can invest their money. We this month depart from our usual course, for two reasons—in the first place, there is really nothing new in the Stock and Share Markets, nor is there anything which we have said touching eligible investment, during the last two months, that will not now equally apply. Stocks and shares—home, foreign, and colonial—are pretty much as they were two months ago, the fluctuations in prices being such as to leave them at nearly the same prices, with the exception that colonial securities generally are a little better, and that railway, bank, and telegraph companies' shares are generally lower, the return they make to purchasers, therefore, being proportionately higher. The difference in prices, however, is scarcely appreciable in the rate of the dividends. In the second place, we deviate from our usual course because we wish to take the earliest opportunity of bringing under the notice of our readers an investment such as is seldom to be found, comparing the price at which it may at present be bought into and the very large returns which it will certainly make upon any money placed in it. Referring to our last page for the details comprised in an abridged prospectus, including the professional reports of two or three of the most competent and reliable mining engineers, we may here supply some additional facts, of which we have a personal knowledge.

The Principality of Wales, undoubtedly, presents the largest and richest lead-mining area in the kingdom, and mining is being actively and profitably prosecuted in both North and South Wales. The Principality, in fact, bids fair to take that place in lead-mining which it posseses in coal-getting. Cardiganshire and Montgomeryshire—the oldest scenes of lead-mining skill and labour—are full of activity, and in Denbighshire and Flintshire some very rich mines are being opened, which promise ere long to stand upon a level, in the profits to be realised, with Minera and other mines in the neighbourhood, which have returned profits exceeding 2,000,000*l.* sterling.

The new undertaking we desire to bring under the notice of our readers is the working of a portion of the large and rich lode of lead which extends six miles into the coal measures east, and lying between Ruthin and Mold, in the parish of Llanarmon, in the county of Denbigh. The western part of this famous lode, which was worked in what is known as the Old Nant Mine—a household word with the old miners in the county—is, in some parts, from 16 to 18 ft. wide, the deposits of lead often being in solid masses, and returned to its proprietors profits amounting to little short of 1,000,000*l.* It is upon the eastern part of this lode—which is upwards of a mile in length, and runs into the coal measures, in approaching which all the known lodes in the neighbourhood become richer and richer—with a side lode of a similar character, and a large horizontal deposit of lead still further east, that the Llanarmon Lead Mining Company (Limited) proposes to work, and the company has guarantees of great success. As may be seen in the prospectus, a shaft has been sunk, 92 fathoms deep, somewhere about midway in the course of that part of the lode to be worked by the Llanarmon Company, and levels have been driven east into very extensive deposits of lead, a considerable proportion of which is left standing; and it requires only ventilation in the levels, and the unwatering of the lowest level, to ensure large returns, and a great extension of the run of open ore ground, for which purposes the machinery is all complete, and in position. The character of the lead deposits in this part of the mine may be judged of by a number of samples which lie at the office, No. 36, Cornhill. Further east, on this lode, the sinking of a shaft has been commenced on what is termed in that part of the country a "flat"—that is, a large deposit of lead thrown down horizontally between the sandstone and the limestone on the borders of the coal measures; and, no doubt, exists in the minds of the most experienced miners in the locality that here will be found a valuable and most profitable mine in itself within a few months from the present time.

We speak of this mining enterprise, then, as one far beyond a speculation, unless it be—as it reasonably may be—for larger returns than we have been anticipating. The western part of the lode, as far as it has been worked—and it is a long way from being exhausted—has realised, as we have said, enormous profits; Minera has realised nearly 500,000*l.*; and two or three other mines in the neighbourhood, though not so close to the coal measures—as they approach which the lead deposits increase in bulk and value—have realised at least another 250,000*l.* But, as we have intimated, there is no necessity for reasoning by analogy as to the value of the Llanarmon Mines; enough work has been done there, and enough ore ground has been laid open, or has been proved to exist, to justify the high opinion expressed by all practical miners and engineers who know or have inspected the ground as to the future of the sett. The company is to obtain the mines, and the valuable machinery and entire plant, for a sum not exceeding what the latter had been valued at—5000*l.*; and they who purchase while the shares can be obtained at par (2*l.*, having no outstanding liability) will, we have little doubt, realise a profit or obtain a permanent investment far exceeding anything that can be realised from any other mining enterprise in Wales. In forming a judgment of this undertaking, we have availed ourselves of the judgment and experience of several reliable agents—amongst others of those of Captain Aaron Ede and Captain John Pryor, who know the ground and neighbourhood well, the former of whom is now engaged by the company as the resident manager; and, although their communications to us are, in substance, the same as those made to the promoters of the company, a line or two in addition to what is given in the prospectus may be as satisfactory to our readers as they have been to us.

Capt. Ede says—"The position is good, being situated on the eastern margin of the carboniferous limestone, overlaid by the grit rock and well-known flat measures skirting the coal formation. In the limestone the deposits of ore are generally found in veins or lodes, and in the sandstone in what are denominated 'flats.' Both these lead-producing measures are in the grant—in fact, the largest portion of the take is comparatively untouched, and showing indications of vast mineral deposits. A great acquisition to the property is the easy flow of water in its underground workings, thereby doing away with heavy and expensive machinery for draining. Another important thing is the possession by the company of the piece of ground known as Mynydd Ddu, which when the Nant Mine was returning a profit of 13,000*l.* a year was not opened, owing to three or four intermediate fields being in the possession of another party, who asked a considerable sum for it. This is now to be had by your company, and there can be no doubt that a large and profitable mine will here be opened, as it is all virgin ground. I consider the merits of the property as of no ordinary character, and I confidently believe that, in addition to what is seen, enormous metallic wealth will be discovered."

Capt. John Pryor writes—"I have had to do with this sett for the last 20 years, and can say that they have probably been the richest and most productive lead mines in Denbighshire, and that they acquired, during their working, a widespread celebrity for the remarkable yield of lead ore which they afforded. The returns have been equalled by only one mine in the Principality—the Minera, or, I might say, the adjoining mine. They are both on precisely the same bearing measures, and the matrix of both lodes are of the same nature, and I have not the least doubt that the Llanarmon Mines will prove equally productive. I do not know of a more masterly lode anywhere. Its course is well defined for a distance of some five or six miles, and shafts, &c., have been sunk upon the lode in this distance, and almost without exception success has been met with. In this take you have the fact that four or five champion lodes traverse the entire sett, all of which, in the western part, have been worked upon to a profit. I should also inform you that there exists, in the eastern part of the take, one of the richest horizontal lodes—or, as the miners term it, 'a flat'—ever discovered in Flintshire or Denbighshire. It has been worked upon in different parts of the neighbourhood to an incredible success; but such is the fact. . . . The machinery on the mine, consisting of steam-engines for pumping, winding, and crushing, is very valuable for a full development of the property. There are also dressing-floors complete, with every requisite for large returns; as also offices, storehouses, and materials of every description necessary for a large mine. It simple remains, therefore, to work the ore ground of the mine, and to open it out fairly and properly, to realise great results."

Mining in Colorado.—From Central City, Gilpin County, Mr. Thos. Jennings, an experienced Cornish miner, writes (Sept. 12):—"We have struck one of the best gold lodes yet discovered in Colorado, Nevada, or California. We adjoin the California Gold Mine, which is now sinking at a depth of 150 feet below the surface; they have a lode there 8 feet wide, with a leader in it 3 feet wide. The ore is readily sold to Professor Hill, a smelter here. This part of the lode, as it comes out of the shaft, and not dressed at all, is worth $114 per ton; the remainder of the lode will return in the stamps-mill 14 to 16 ozs. of gold to the ton of stuff. Their net profits have been from April 1 last over $1000 per day. They sold their retort of gold at the bank here the other day, for nine days' run at the stamps-mill, amounting to 45 lbs., worth $11,000. Their net profit for last month was $33,000. This mine belongs to only two miners. Now, we have the sett adjoining them on the west end, and on the same lode. Their shaft is within 6 feet of their boundary. We have a shaft within 45 feet of their main shaft, where the richest part of the lode is. Our lode is 4 ft. 6 in. wide, and is making larger as it goes down. Our shaft is now down 56 feet below surface. Some of our best ore is sold at $108 per ton, the remainder producing in the stamps-mill 14 ozs. of gold to the ton. When we get a little deeper it is expected that our lode will be equally as rich as that of the California Mine. In about six months from this time we estimate that our profits will exceed those of the California Mine, as our sett is 1400 feet long on the course of the lode, while the California lode is only 200 feet long."

The "Iron Blacksmith."—A Steubenville mechanic named Wm Kenyon has invented, and has now in operation in that place, a very marvellous piece of mechanism, which he styles the "Iron Blacksmith." It occupies the space of an ordinary sized cask, is very compact, is driven by an engine of herculean strength, and the machine itself is of almost incalculable power. It is at present constructed for the manufacture of wrenches used by machinists, gas-fitters more particularly. These wrenches are produced from solid steel, at the rate of one every three seconds, doing the work in three seconds which would require the swiftest and most expert workman a whole day to do, besides executing the work much better. When the "Iron Blacksmith" is "fully armed and equipped," it will produce, as if by magic, any description of tool or implement; also, chains, horse-shoes, fingers for mowers and reapers, all with the same facility and exactness; in fact, almost every article which now comes from the stalwart blows from the arm, and directed by the mental skill and ingenuity of the intelligent smith. This machine, which is the result of many years of thought and labour, besides an expenditure of many thousands of dollars, is destined to revolutionise the smithing trade.—*Sharon Times*, Sept. 9.

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